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10/050,573	01/18/2002	Tetsuo Yamada	Q66582	7082

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EXAMINER

DANIELS, ANTHONY J

ART UNIT PAPER NUMBER

2622

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/050,573

Applicant(s)

YAMADA ET AL.

Examiner

Anthony J. Daniels

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 and 15-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-10, 12 and 15-24 is/are rejected.
- 7) ☒ Claim(s) 4 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/21/2006 has been entered.

### ***Response to Amendment***

2. Applicant's amendment to claim 16 has overcome the examiner's USC 112 rejection.

### ***Response to Arguments***

3. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3,5-7,10,12,16,20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Monoi (US # 6,153,874).

As to claim 1, Monoi teaches a charge read-out method (Figure 1), comprising: moving charges into a plurality of charge transfer paths (Figure 1, CCD registers “31” and “32”) disposed on both sides along a row of a plurality of light receiving units arranged linearly (Figure 1, pixel line “1b”), the charges being generated and stored in the plurality of light receiving units having received light (Col. 4, Lines 53-59); and transferring and outputting the moved charges along the charge transfer paths disposed on both sides of the plurality of light receiving units (Col. 4, Lines 57-59), wherein each of the plurality of light receiving units is connected to a light receiving path on each side to permit the charges to exit from both sides of the light receiving units (Figure 1); and obtaining a signal value indicating quantity of light received by a light receiving unit from the plurality of light receiving units, wherein the signal value is obtained by adding charges that have been accumulated in the same light receiving unit (Col. 4, Lines 10-17; Col. 7, Lines 33-37 (Claim 1)) and that were separated to move through different light receiving paths positioned on each side of the same light receiving unit (Col. 4, Lines 60-65), wherein said each light receiving unit is a single, integrally formed, storage container for storing the generated charges (Col. 4, Lines 47-50).

As to claim 2, Monoi teaches a solid-state imaging device (Figure 1), comprising: a plurality of light receiving units arranged linearly for receiving light to generate and store charges (Figure 1, pixel line ‘1b’; Col. 4, Lines 60-65); a plurality of charge transfer paths disposed on both sides of said plurality of light receiving units for receiving the charges exiting from said plurality of light receiving units and for transferring and outputting the received charges (Figure 1, pixel line ‘1b’; Col. 4, Lines 60-65); a controller for moving the charges stored in said plurality of light receiving units into said plurality of charge transfer paths, and for

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transferring and outputting the charges moved into said plurality of charge transfer paths disposed on both sides of said plurality of light receiving units (Figure 2, two-phase pulse system  $\phi 1$  and  $\phi 2$ ); and an addition unit for obtaining a signal value indicating quantity of light received by a light receiving unit from the plurality of light receiving units, wherein the signal value is obtained by adding charges that have been accumulated in the same light receiving unit (Figure 2, conflating section "7"; Col. 4, Lines 10-17; Col. 7, Lines 33-37 (Claim 1); "...half the amount...") and that were separated to move through different light receiving paths positioned on each side of the same light receiving unit (Col. 4, Lines 60-65), wherein said each light receiving unit is a single, integrally formed, storage container for the received charges (Col. 4, Lines 47-50).

As to claim 3, Monoi teaches a solid-state imaging device (Figure 1) comprising: a plurality of light receiving units arranged linearly for receiving light to generate and store charges (Figure 1, pixel line '1b'; Col. 4, Lines 60-65); a plurality of charge transfer paths disposed on both sides of said plurality of light receiving units for receiving the charges exiting from said plurality of light receiving units and for transferring and outputting the received charges (Col. 4, Lines 60-65); a controller for moving the charges stored in said plurality of light receiving units into said plurality of charge transfer paths, and for transferring and outputting the charges moved into said plurality of charge transfer paths disposed on both sides of said plurality of light receiving units (Figure 2, two-phase pulse system  $\phi 1$  and  $\phi 2$ ), wherein each of said plurality of light receiving units includes a plurality of segments separated by an internal potential barrier (Figure 2, isolation region "50") so that charges stored in said plurality of light receiving units are moved to said plurality of charge transfer paths (Col. 4, Lines 47-65); and an

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addition unit for obtaining a signal value indicating quantity of light received by a light receiving unit from the plurality of light receiving units, wherein the signal value is obtained by adding charges that have been accumulated in the same light receiving unit and that were separated to move through different light receiving paths positioned on each side of the same light receiving unit (Figure 2, conflating section “7”; Col. 4, Lines 10-17; Col. 7, Lines 33-37 (Claim 1); “...half the amount...”), wherein said each of said plurality of light receiving units is a single, integrally formed, storage container for the received charges (Col. 4, Lines 47-50).

As to claim 5, Monoi teaches the charge read-out method according to claim 1, wherein each of the plurality of light receiving units is connected to a light receiving path on at least two sides to permit the charges to exit from both sides of the light receiving unit and wherein said each light receiving unit stores generated charges for at most a single pixel (Figure 1, CCD registers “31” and “32”; Col. 4, Lines 60-65).

As to claim 6, Monoi teaches the solid-state imaging device according to claim 2, wherein each of the plurality of light receiving units is directly connected to at least two transmission gates, and wherein each of the two transmission gates facilitates transmission of the charge from its respective light receiving unit to a charge transfer path (Figure 2, two-phase pulse system  $\phi 1$  and  $\phi 2$ ), and wherein said each light receiving unit stores generated charges for at most a single pixel (Col. 4, Lines 47-50).

As to claim 7, Monoi teaches the solid-state imaging device according to claim 2, wherein the charges from a light receiving unit of the plurality of light receiving units exit the light receiving unit on both sides and are transmitted to a respective charge transfer path from the plurality of charge transfer paths (Col. 4, Lines 60-65).

As to claim 10, Monoi teaches the solid-state imaging device according to claim 3, wherein the internal barrier is provided without impeding photoelectric conversion of its respective light receiving unit (Col. 4, Line 66 – Col. 7, Line 2).

As to claim 12, Monoi teaches the solid-state imaging device according to claim 3, wherein the internal potential barrier diagonally divides a light receiving unit from the plurality of light receiving units into segments (*Looking at pixel line "1b" from 45 degree angle shows a diagonal separation of the photodiodes.*).

As to claim 16, Monoi teaches the solid-state imaging device according to claim 3, wherein said each light receiving unit stores generated charges for at most a single pixel (Col. 4, Lines 47-50) and wherein said each light receiving unit has at least two exits for the charges (Figure 1, Figure 2; Col. 4, Lines 60-65).

As to claim 20, Monoi teaches the solid-state imaging device according to claim 2, wherein the charge transfer paths are vertical paths that transfer charges to be read (Figure 1).

As to claim 21, Monoi teaches the solid-state imaging device according to claim 3, wherein said plurality of charge transfer paths are common, vertical charge transfer paths for transferring charges subsequently read (Figure 1, CCD registers transfer charge for all of pixel line "1b"; Col. 4, Lines 60-65).

As to claim 22, Monoi teaches the solid-state imaging device according to claim 3, wherein each of said plurality of charge transfer paths transfer charges from more than one light receiving unit (Figure 1, CCD registers transfer charge for all of pixel line "1b").

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monoi (US # 6,153,874) in view of Burke et al. (US # 6,331,873).

As to claim 8, Monoi teaches the solid-state imaging device according to claim 3. The claim differs from Monoi in that it further requires that the internal barrier comprises: a first conductive impurity layer and a second conductive impurity layer selectively formed on top of the first conductive impurity layer, the second conductive impurity layer has a surface covered with a first conductive high density layer in a light receiving unit from the plurality of light receiving units, and wherein the second conductive impurity layer or the first conductive impurity layer is of relative low density.

In the same field of endeavor, Burke et al. teaches a blooming control structure using a potential barrier to deflect photo-generated electrons toward channels (Figure 11 E, Col. 7, Lines

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28-67). The barrier further comprises a first conductive impurity layer (Figure 11E, p+ "48") and a second conductive impurity layer (Figure 11E, n- "40" and insulating layers) selectively formed on top of the first conductive impurity layer (Figure 11E), the second conductive impurity layer has a surface covered with a first conductive high density layer in a light receiving unit from the plurality of light receiving units (Figure 11 E, p+ "84"), and wherein the second conductive impurity layer or the first conductive impurity layer is of relative low density (Figure 11 E, second layer (n-)). In light of the teaching of Burke et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the blooming control potential barrier structure of Burke et al. to separate the photodiodes of Monoi, because an artisan of ordinary skill in the art would recognize that this would effectively prevent a decrease in charge accumulation and a reduction in quantum efficiency due to the interaction of charges of separate pixel sites (i.e. blooming) (see Burke et al., Col. 8, Lines 10-18).

As to claim 9, Monoi, as modified by Burke et al., teaches the solid-state imaging device according to claim 3, wherein the internal barrier comprises a PNP structure (see Burke et al., Figure 11E, p+ "48", n- "40", p+ "84"), formed on a p-substrate (see Burke et al., Figure 11E, p-substrate "42").

6. Claims 15, 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monoi (US # 6,153,874).

As to claim 15, Monoi teaches the solid-state imaging device according to claim 3, wherein the plurality of charge transfer paths are vertical paths disposed on both sides of each of said plurality of light receiving units (Figure 1, CCD registers "31" and "32"), and wherein

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charges exiting from each of said plurality of light receiving units are received by charge transfers paths on both sides of a respective light receiving unit (Figure 1). The claim differs from Monoi in that it further requires that the charges transferred on both paths be subsequently converted into digital values by a converter.

In a prior art method, Monoi discloses that it is known to transfer charges from both sides of a pixel on a line sensor, convert these charges to digital form, and then add them in digital form (Col. 4, Lines 32-44). In light of the teaching of the prior art method, it would have been obvious to one of ordinary skill in the art to perform addition of the charges after A/D conversion, because this would provide an effective way to perform addition of signals and can be implemented in integrated circuits if need be.

As to claim 17, Monoi teaches the solid-state imaging device according to claim 16, wherein each of the at least two exits is connected to a separate charge transfer path of said plurality of charge transfer paths (see Monoi, Figure 1), and wherein the plurality of charge transfer paths transfer the charges to a converter converting the charges to digital values (see rejection of claim 15).

As to claim 18, Monoi teaches the charge read-out method according to claim 1, wherein the charges from the charge transfer paths are subsequently converted into digital values (see rejection of claim 15) and wherein said each light receiving unit stores generated charges for only one single pixel (see Monoi, Col. 4, Lines 47-50).

As to claim 19, Monoi teaches the charge read-out method according to claim 1, wherein the charge transfers paths are vertical paths transferring charges for subsequent conversion into digital form (see Monoi, Figure 1 and the rejection of claim 15).

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monoi (US # 6,153,874) in view of Saigusa (US 2004/0028286).

As to claim 23, Monoi teaches a solid-state imaging device for detecting radiation images, comprising: a plurality of linearly arranged light receiving units for detecting photons and storing charges generated by the photons (Col. 1, Lines 8-12), wherein each of the plurality of light receiving units is a single, integrally formed storage container for storing the generated charges (Col. 4, Lines 47-50) and comprises a first charge exit to exhaust a first portion of charges generated in the light receiving unit to the exterior of the light receiving unit and a second charge exit different from the first charge exit to exhaust a second portion of charges to the exterior of the light receiving unit, wherein the second portion of charges is other charges different from said first portion of charges (Col. 4, Lines 60-65); a first charge transfer path connected to the first charge exit (Figure 1, CCD register "31"), and disposed along the linearly arranged light receiving units (Figure 1), for receiving the first portion of charges exhausted from the first charge exit and for transferring the first portion of charges (Col. 4, Lines 60-65); a second charge transfer path, different from the first transfer path connected to the second charge exit (Figure 1, CCD register "32"), and disposed along the linearly arranged light receiving units, for receiving the second portion of charges exhausted from the second charge exit and for transferring the second portion of charges (Col. 4, Lines 60-65); and an adding unit (Figure 1, conflating section "7") that adds a first charge signal obtained based on the first portion of charges which are transferred through the first charge transfer path and a second charges signal obtained based on the second portion of charge which are transferred through the second charge

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transfer path (Col. 4, Lines 17-20), said first portion of charges and said second portion of charges being exhausted from the same light receiving unit at the same time through the first charge exit and the second charge exit (Col. 4, Lines 60-65). The claim differs from Monoi in that it further requires that the light receiving units detect stimulated emission light generated from storage phosphor sheets by scanning with excitation light.

In the same field of endeavor, Saigusa teaches a line sensor unit comprising a plurality of X-ray radiation receiving units ([0023], Lines 1-6). In light of the teaching of Saigusa, it would have been obvious to one of ordinary skill in the art to include the ability of the line sensor in Monoi to convert X-ray radiation, because an artisan of ordinary skill in the art would recognize that this line sensor could then be used in medical applications (see Saigusa, Col. [0002]).

As to claim 24, Monoi, as modified by Saigusa, teaches a solid-state imaging device according to Claim 23, wherein the first charge exit and the second charge exit face each other and wherein the same light receiving unit is positioned in between the first charge exit and the second charge exit (see Monoi, Figure 1).

#### ***Allowable Subject Matter***

8. Claims 4 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: As to claim 4, the prior art does not teach or fairly suggest four segments obtained by separating a single, integrally formed, light receiving unit using an internal cruciform barrier in combination

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with claim 3. As to claim 11, the prior art does not teach or fairly suggest triangularly shaped segments separated by an internal potential barrier.

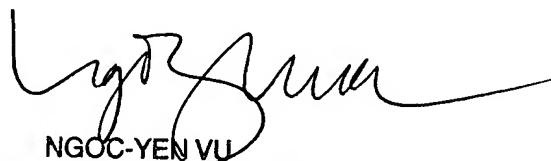
*Conclusion*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Daniels whose telephone number is (571) 272-7362. The examiner can normally be reached on 8:00 A.M. - 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc-Yen Vu can be reached on (571) 272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AD  
10/24/2006



NGOC-YEN VU  
SUPERVISORY PATENT EXAMINER